

CLAIMS

1. A device for abrading tissue, which includes:

- a) a gas inlet port connected to a pressurized gas source;
- b) a liquid inlet port connected to a pressurized liquid source; and
- 5 c) a mist jet delivery nozzle arrangement including
 - i) at least one gas discharge nozzle arranged to receive a flow of pressurized gas from said gas inlet port and configured to accelerate the flow of gas so as to discharge it at an elevated velocity; and
 - ii) at least one liquid discharge nozzle arranged to receive a flow of liquid from
- 10 the elevated velocity flow of gas, thereby to similarly accelerate the velocity of the discharged liquid as a mist of accelerated droplets.

2. A device in accordance with Claim 1, which further includes suction means which includes

- 15 a) a suction conduit disposed in operative association with respect to said mist jet delivery nozzle arrangement and including at least one suction port;
- b) an atmospheric air inlet conduit having at least one air inlet port disposed in operative association with respect to said suction conduit and to said mist jet delivery nozzle arrangement; and
- 20 c) means for applying a suction force to said suction conduit, thereby to cause suctioning from said at least one suction port of liquid and abraded tissue particles in the vicinity of said mist jet delivery nozzle arrangement.

3. A device for abrading tissue, which includes:

- a) a gas inlet port connected to a pressurized gas source;
- b) a liquid inlet port connected to a pressurized liquid source;
- 25 c) a mist jet delivery nozzle arrangement; and

d) a suction nozzle arrangement including

- i) a suction conduit disposed in operative association with respect to said mist jet delivery nozzle arrangement and including at least one suction port;
- 5 ii) an atmospheric air inlet conduit having at least one air inlet port disposed in operative association with respect to said suction conduit and to said mist jet delivery nozzle arrangement; and
- 10 iii) means for applying a suction force to said suction conduit, thereby to cause suctioning from said at least one suction port of liquid and abraded tissue particles in the vicinity of said mist jet delivery nozzle arrangement.

4. A device in accordance with Claim 1, wherein gas is supplied from the pressurized gas source at a pressure in the range of 40-150 p.s.i.

5. A device in accordance with Claim 1, wherein liquid is supplied from the pressurized liquid source at a pressure in the range of 1 to 5 p.s.i.

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6. A device in accordance with Claim 1, wherein the gas supplied from the pressurized gas source includes at least one gas selected from: air, oxygen, carbon dioxide and nitrogen.

7. A device in accordance with Claim 1, wherein the gas discharged from said at least one gas discharge nozzle is accelerated to a velocity in the range of sub-sonic to supersonic velocity.

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8. A device in accordance with Claim 1, wherein said mist jet delivery nozzle arrangement includes at least two gas discharge nozzles.

9. A device in accordance with Claim 1, wherein said mist jet delivery nozzle arrangement includes at least two liquid discharge nozzles.

25 10. A device in accordance with Claim 1, wherein said at least one liquid discharge nozzle is disposed substantially concentric and within said at least one gas discharge nozzle.

11. A device in accordance with Claim 1, wherein said at least one gas discharge nozzle is a device configured to have a converging portion, a throat portion and a diverging portion.
12. A device in accordance with Claim 1, wherein said device is configured to be used while being held in one hand.
- 5 13. A device in accordance with Claim 1, wherein the flow of gas entering said at least one gas discharge nozzle is at a pressure of a first magnitude, and said at least one gas discharge nozzle is operative to cause a pressure drop in the gas flow therethrough such that the pressure of the gas discharged from said at least one gas discharge nozzle is of a second magnitude, wherein the first magnitude is at least twice the second magnitude, so as to cause a shock wave in the gas and liquid flow downstream of said at least one gas discharge nozzle and said at least one liquid discharge nozzle so as to cause atomizing of the liquid discharged from said at least one liquid discharge nozzle into a high velocity mist of droplets, thereby to form a mist of droplets suspended in the flow of discharged high velocity gas.
- 15 14. A system for abrading tissue, which includes:
 - a) a pressurized gas source;
 - b) a pressurized liquid source; and
 - c) a device which includes:
 - i) a gas inlet port connected to said pressurized gas source;
 - 20 ii) a liquid inlet port connected to said pressurized liquid source; and
 - iii) a mist jet delivery nozzle arrangement including
 - 1) at least one gas discharge nozzle arranged to receive a flow of pressurized gas from said gas inlet port and configured to accelerate the flow of gas so as to discharge it at an elevated velocity; and
 - 2) at least one liquid discharge nozzle arranged to receive a flow of liquid from said liquid inlet port and operative to discharge the flow of liquid into the elevated velocity flow of gas, thereby to similarly accelerate the velocity of the discharged liquid as a mist of accelerated droplets.

15. The system according to Claim 14, wherein said system further includes

- a) a suction conduit disposed in operative association with respect to said mist jet delivery nozzle arrangement and including at least one suction port;
- 5 b) an atmospheric air inlet conduit having at least one air inlet port disposed in operative association with respect to said suction conduit and to said mist jet delivery nozzle arrangement; and
- c) means for applying a suction force to said suction conduit, thereby to cause suctioning from said at least one suction port of liquid and abraded tissue particles in the vicinity of said mist jet delivery nozzle arrangement.

10 16. The system according to Claim 14, wherein gas is supplied from said pressurized gas source at a pressure in the range of 40-150 p.s.i.

17. The system according to Claim 14, wherein liquid is supplied from said pressurized liquid source at a pressure in the range of 1 to 5 p.s.i.

15 18. The system according to Claim 14, wherein the gas supplied from said pressurized gas source includes at least one gas selected from: air, oxygen, carbon dioxide and nitrogen.

19. The system according to Claim 14, wherein the gas discharged from said at least one gas discharge nozzle is accelerated to a velocity in the range of sub-sonic to supersonic velocity.

20 20. The system according to Claim 14, wherein said mist jet delivery nozzle arrangement includes at least two gas discharge nozzles.

21. The system according to Claim 14, wherein said mist jet delivery nozzle arrangement includes at least two liquid discharge nozzles.

22. The system according to Claim 14, wherein said at least one liquid discharge nozzle is disposed substantially concentric and within said at least one gas discharge nozzle.

25 23. The system according to Claim 14, wherein said at least one gas discharge nozzle is a device configured to have a converging portion, a throat portion and a diverging portion.

24. The system according to Claim 14, wherein said device is configured to be used while being held in one hand.

5 25. The system according to Claim 14, wherein the flow of gas entering said at least one gas discharge nozzle is at a pressure of a first magnitude, and said at least one gas discharge nozzle is operative to cause a pressure drop in the gas flow therethrough such that the pressure of the gas discharged from said at least one gas discharge nozzle is of a second magnitude, wherein the first magnitude is at least twice the second magnitude, so as to cause a shock wave in the gas and liquid flow downstream of said at least one gas discharge nozzle and said at least one liquid discharge nozzle so as to cause atomizing of 10 the liquid discharged from said at least one liquid discharge nozzle into a high velocity mist of droplets, thereby to form a mist of droplets suspended in the flow of discharged high velocity gas.

26. A method of abrading tissue which includes the following steps:

15 a) accelerating a flow of gas through at least one gas nozzle so as to provide a gas discharge flow at an elevated velocity;

b) introducing into the elevated velocity gas discharge flow a flow of liquid, thereby to fragment the liquid into a mist of droplets, and to accelerate the mist to an accelerated velocity similar to the velocity of the gas discharge flow; and

c) exposing a desired tissue mass to the accelerated droplet mist.

20 27. The method according to Claim 26, includes an additional step of applying a suction force to a suction conduit, thereby to cause suctioning from at least one suction port of liquid and abraded tissue particles in the vicinity of the gas and mist discharge flow.

25 28. The method according to Claim 26, wherein said step of accelerating a flow of gas includes accelerating the flow of gas to a velocity in the range of sub-sonic to supersonic velocity.

29. The method according to Claim 26, wherein said step of accelerating a flow of gas includes accelerating the flow of gas to a velocity in the range of sonic to supersonic velocity.

30. The method according to Claim 26, wherein said step of accelerating a flow of gas includes accelerating a gas selected from the group of gases including at least one of air, oxygen, nitrogen and carbon dioxide.

31. The method according to Claim 26, wherein said step of introducing into the elevated velocity gas discharge flow a flow of liquid, includes the flow of gas entering the at least one gas discharge nozzle being at a pressure of a first magnitude, and the at least one gas discharge nozzle being operative to cause a pressure drop in the gas flow therethrough such that the pressure of the gas discharged from the at least one gas discharge nozzle is of a second magnitude, wherein the first magnitude is at least twice the second magnitude, thereby causing a shock wave in the gas and liquid flow downstream of the at least one gas discharge nozzle and the at least one liquid discharge nozzle so as to cause atomizing of the liquid discharged from said at least one liquid discharge nozzle into a high velocity mist of droplets, thereby forming a mist of droplets suspended in the flow of discharged high velocity gas.

32. The method according to Claim 26, wherein said step of exposing a desired tissue mass to the accelerated droplet mist includes holding the device in one hand.

33. The method according to Claim 26, wherein said step of exposing a desired tissue mass includes cleansing the tissue mass thereby to remove contaminants from the tissue mass.

34. The method according to Claim 26, wherein said step of exposing a desired tissue mass includes dispersing accumulated liquid from the tissue mass by the flow of high velocity gas.

35. The method according to Claim 26, wherein said step of exposing a desired tissue mass includes cleansing away and destroying residual anaerobic organisms using a sterile liquid mist in a flow of oxygen gas.